

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES
San Joaquin District
Planning Branch

TECHNICAL INFORMATION RECORD
ON THE ION-EXCHANGE SYSTEM AT THE
LOS BANOS DEMONSTRATION DESALTING FACILITY

by

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This Technical Information Record (TIR) was prepared to document information developed between March 1, 1984, and September 1, 1986. It should be considered preliminary and subject to revision. This is primarily an internal office document with distribution limited to interested individuals and cooperating agencies. The use of trade names is not to be construed as an endorsement of any product or firm.

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CONVERSIONS

Measurement	To Convert	To	Multiply By
Concentration	mg/L of Ca	meq/L	0.050
	mg/L of Mg	meq/L	0.082
	mg/L of Na	meq/L	0.0435
	mg/L of total hardness	meq/L	0.02
	mg/L of Cl	meq/L	0.0282
	mg/L of SO ₄	meq/L	0.0208
	meq/L (any ion)	mg/L as CaCO ₃	50
	ppm	mg/L	1
	grains/gallon	mg/L	17.12
	grains/gallon	lb/million gallons	142.86
Volume	liters	milliliters	1,000
	gallons	liters	3.785
	cubic feet	gallons	7.48
Mass	grams	milligrams	1,000
	grains	milligrams	64.80
	pounds	grams	453.59
	grams	grains	15.43
	pounds	grains	7,000
Resin capacity	eq/L of resin	lb/cubic foot (as CaCO ₃)	3.129
	eq/L of resin	lb/cubic foot (as NaCl)	3.661
	lb/cubic foot	grains/gallon	935.8

DEFINITIONS OF CHEMICAL CONSTITUENT ABBREVIATIONS

Abbreviation	Definition
Ca	Calcium
CO ₃	Carbonate
Cl	Chloride
Cl ₂ -F	Free chlorine
DOC	Dissolved organic carbon
EC	Electrical conductivity
Mg	Magnesium
Na	Sodium
SiO ₂	Silica
SO ₄	Sulfate
TDS	Total dissolved solids
TH	Total hardness
TOC	Total organic carbon
Turb.	Turbidity

FOREWORD

This is one in a series of reports that presents the results of operations conducted by the California Department of Water Resources (DWR) at its demonstration desalting facility in Los Banos, California, between 1984 and 1986.

The Los Banos Demonstration Desalting Facility was the principal feature of DWR's Reverse Osmosis Demonstration Project, which was designed to test the feasibility of disposing of agricultural drainage water by reclamation and reuse in California's San Joaquin Valley.

The Valley contains large areas of agricultural land with subsurface drains. These drains collect brackish water that cannot, generally, be recycled for on-farm use. Consequently, large quantities of drainage water in the Valley must be disposed of in an environmentally safe manner. Reclamation of drainage water by desalting and solar salt-gradient ponds is one acceptable disposal technique. At its Los Banos facility, DWR experimented with a combination of pretreatment, desalting, and brine disposal methods to facilitate reclamation.

One fact that emerged clearly after extensive study of the drainage water disposal problem is that a solution (or solutions) will be expensive. Still, the cost of reclaiming drainage water and reducing its annual volume to manageable quantities could possibly be offset by the production -- at an integrated facility -- of salable water, salts, and solar energy.

The Reverse Osmosis Demonstration Project was formulated to study this possibility. The project began in 1980 with (1) preparation of a conceptual design for a test facility and (2) selection of an engineering consultant to design and build the facility. Construction began at Los Banos in the spring of 1982 and was completed in the summer of 1983 -- the same year that testing of the facility's drainage water pretreatment systems began. Small-scale ion-exchange and reverse-osmosis unit operations commenced in the summer of 1985, and full-scale operations of these units were initiated later that year.

The summer of 1985 also witnessed the filling and stratifying of the facility's solar salt-gradient pond, which reached full operating temperature (190 degrees Fahrenheit) in the summer of 1986. A vapor-compression-evaporator type of desalting unit also went on line in April 1986.

Activities at the desalting facility concluded in the fall of 1986 except the solar pond test operations, which continued through 1989.



Louis A. Beck, Chief
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